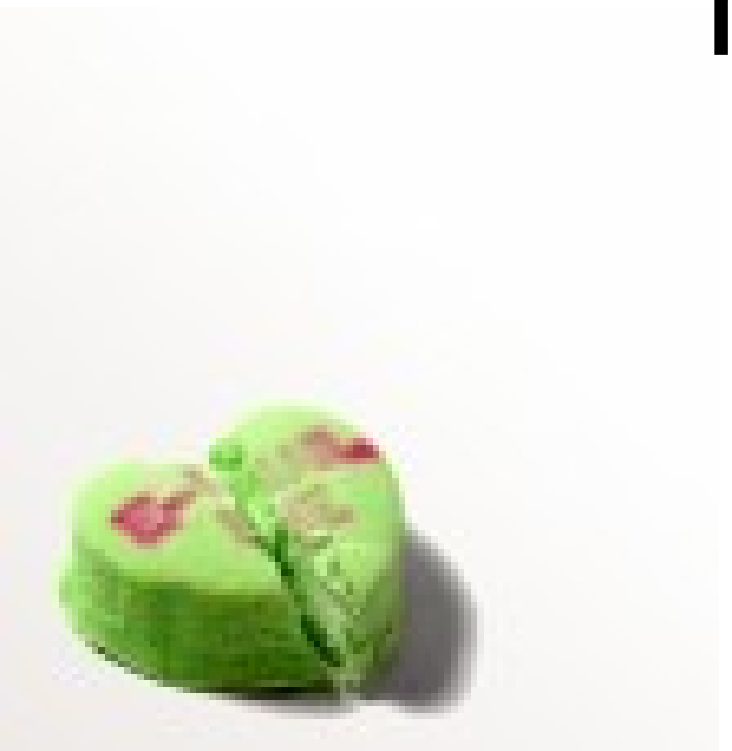
secrets of javascript closures

fronteers, september 2008

stuart langridge

what's a closure?

one of the great mysteries



confusion

zen

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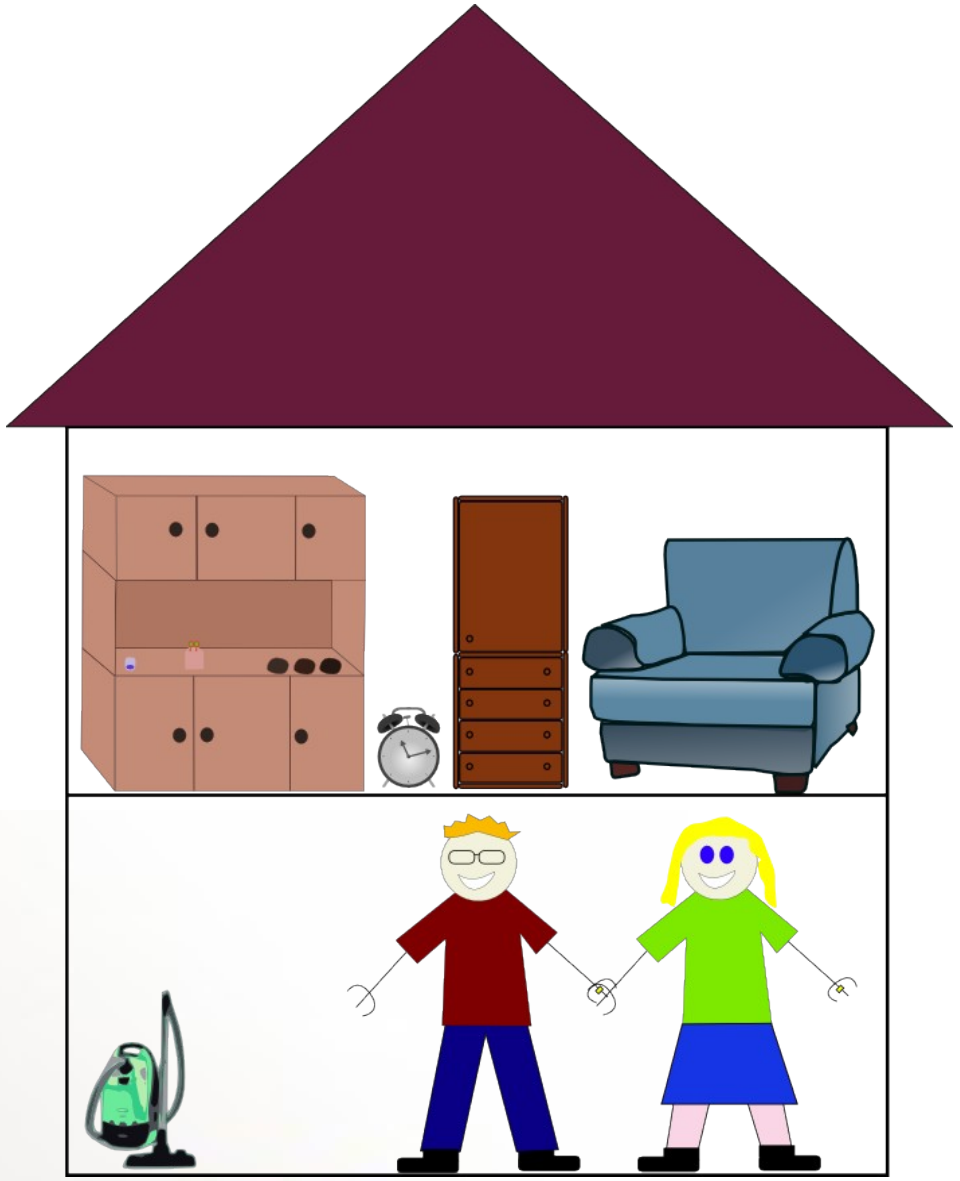
In computer science, a closure is a function that is evaluated in an environment containing one or more bound variables. When called, the function can access these variables.

In com science, a re is a fun on t is evaluate an en onment taining o or m bound va les. W en call the function ess

~~dictionary~~

closure:
where a function remembers what happens around it



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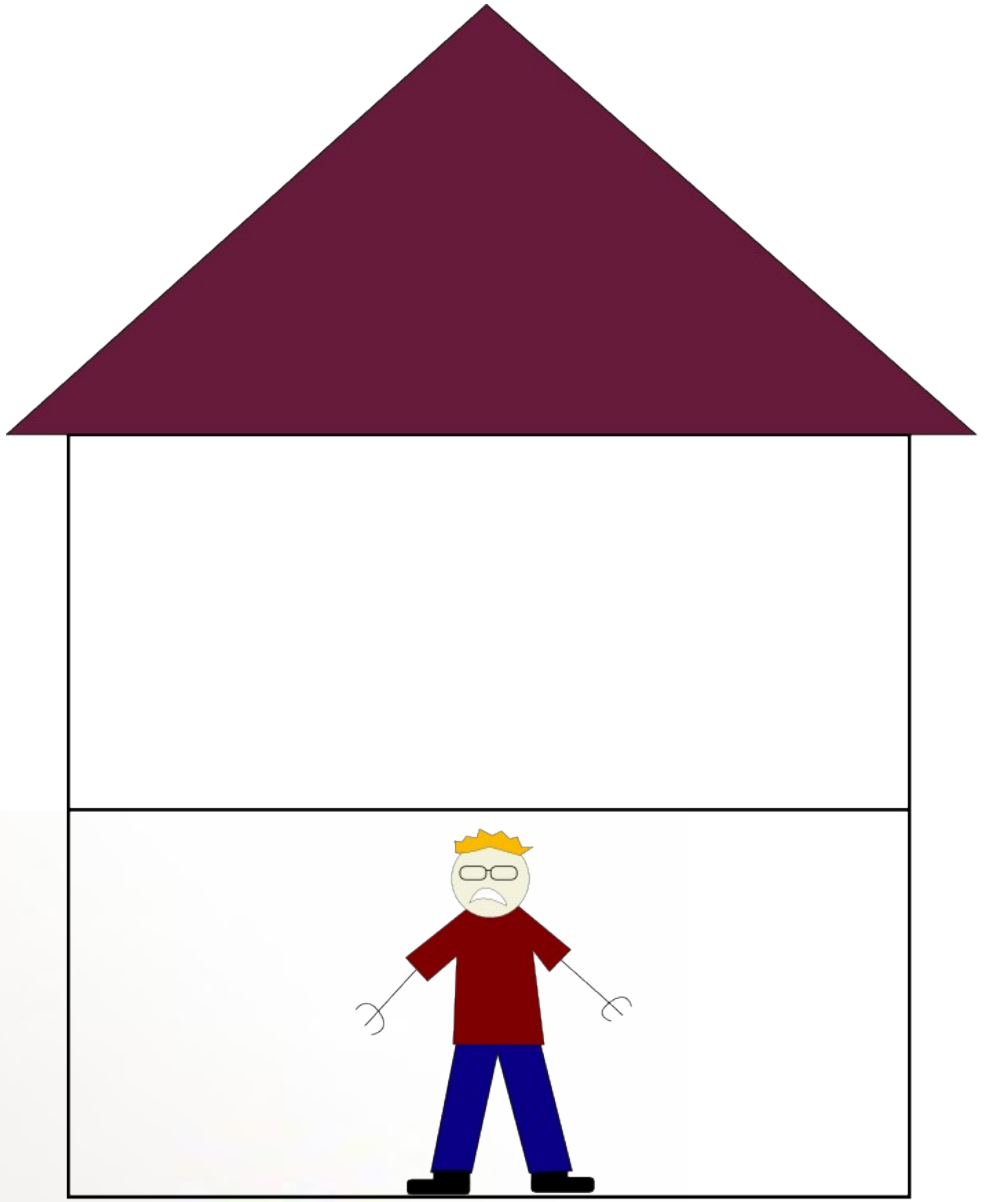

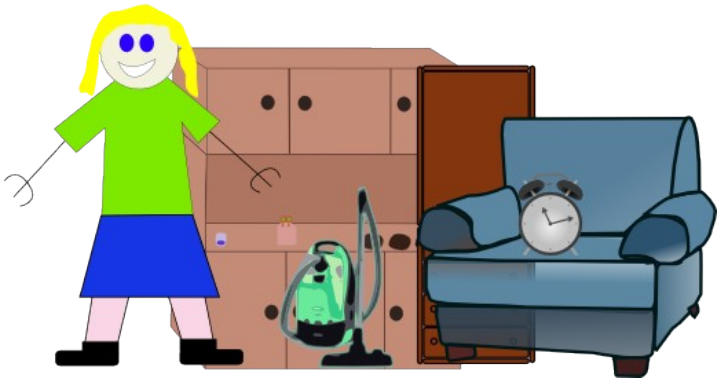

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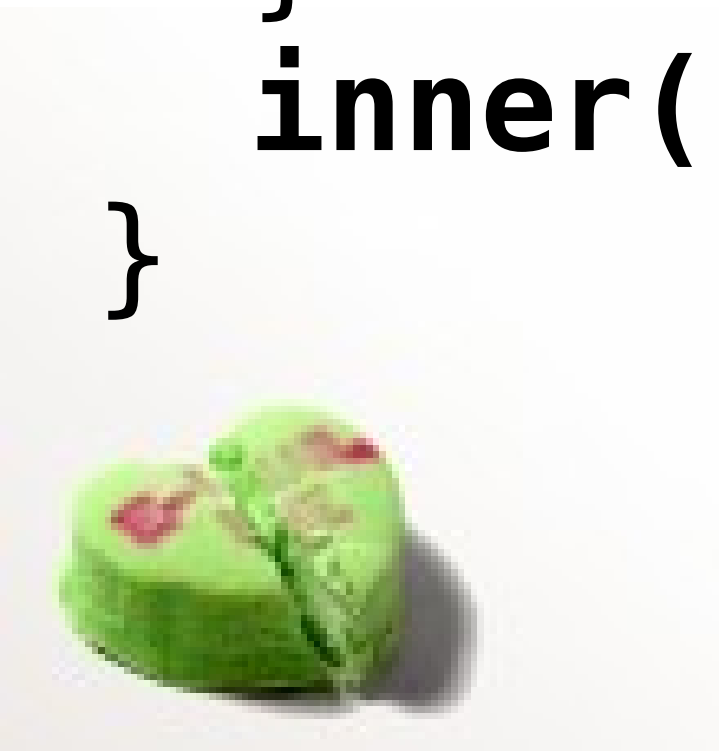
one function
defined inside another

```
function outer() {
   ...
   function inner() {
      ...
   }
   ...
}
```

```
function outer() {
  var x = 5;
  function inner() {
    alert(x);
  }
  inner();
}
```

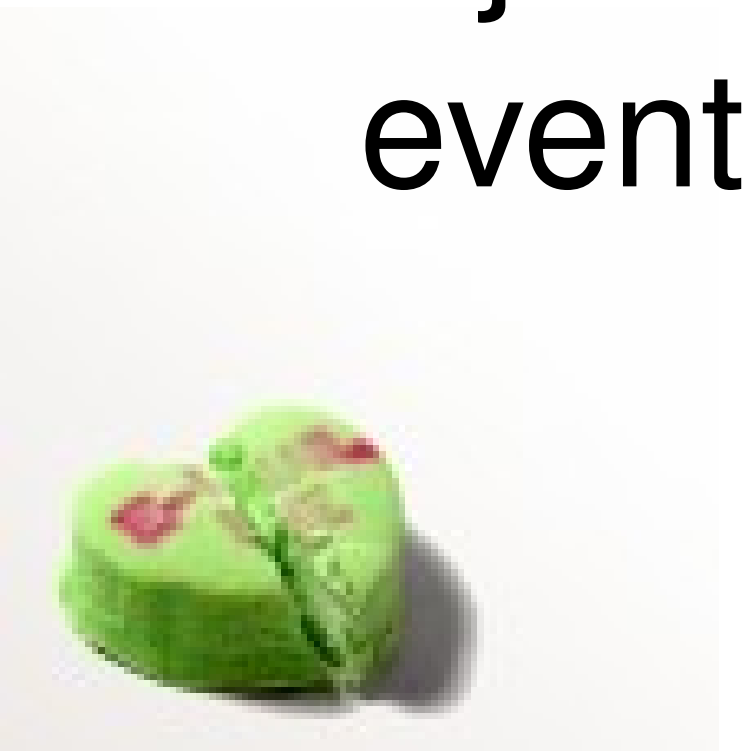


```
function outer() {
  var x = 5;
  function inner() {
    alert(x);
  }
  setTimeout(inner,
5000);
}
```

power

things called later on

setTimeout
setInterval
Ajax callbacks
event handlers



```
function main() {
  var mv = document.getElementById(“mover”);
  var counter = 0;
  var tick = setInterval(function() {
    mv.style.top = counter + “px”;
    counter += 1;
    if (counter > 100) {
      clearInterval(tick);
    }
  }, 100);
}

main();
```

```
function main(mv) {
  var counter = 0;
  var tick = setInterval(function() {
    mv.style.top = counter + “px”;
    counter += 1;
    if (counter > 100) {
      clearInterval(tick);
    }
  }, 100);
}

main(document.getElementById(“mv”));
```

```
function main(mv, start, finish, inc) {
  var tick = setInterval(function() {
    mv.style.top = start + “px”;
    start += inc;
    if (start > finish) {
      clearInterval(tick);
    }
  }, 100);
}

main(document.getElementById(“mv”),0,100,1);
```

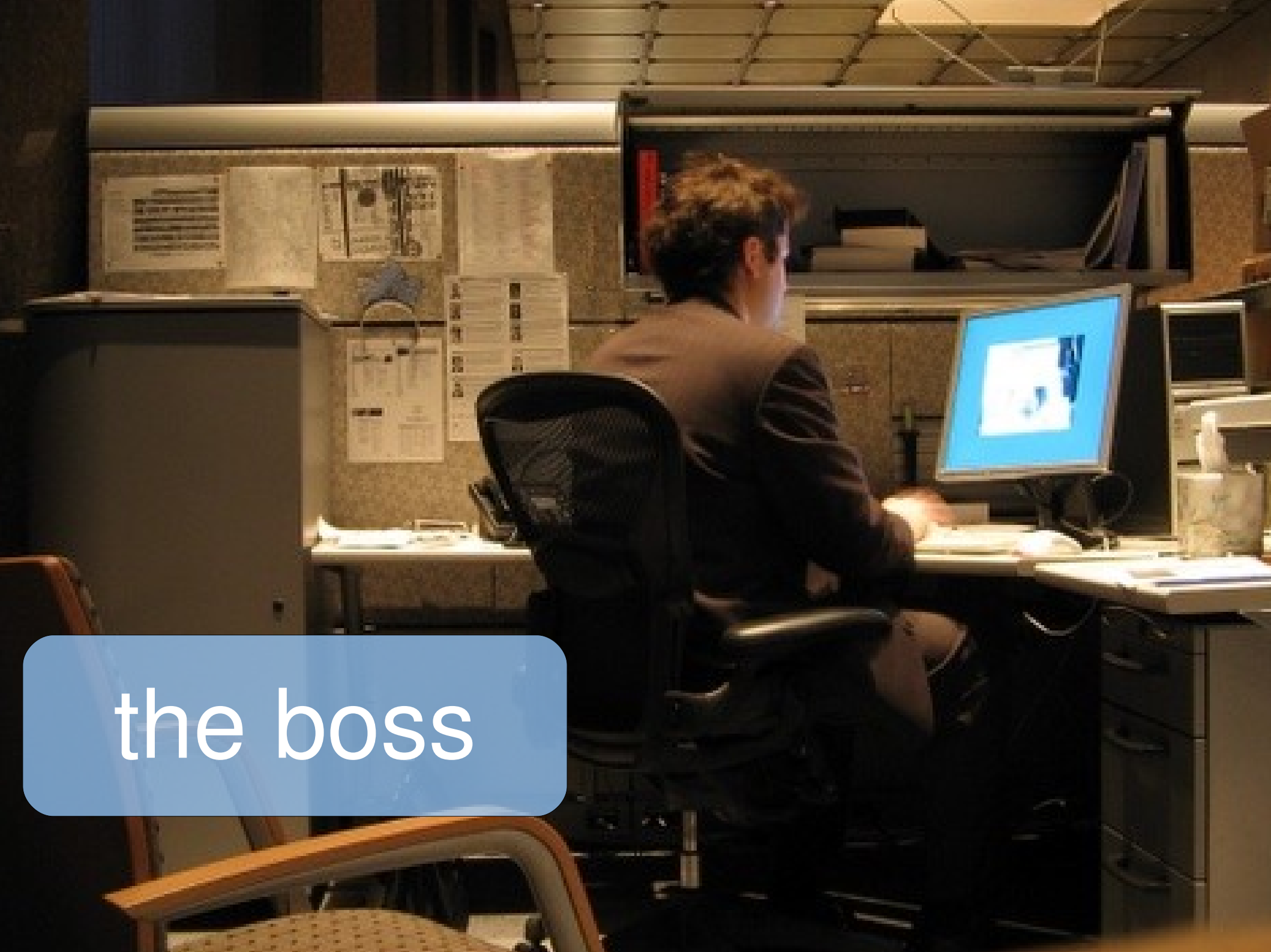
this

that

this and that

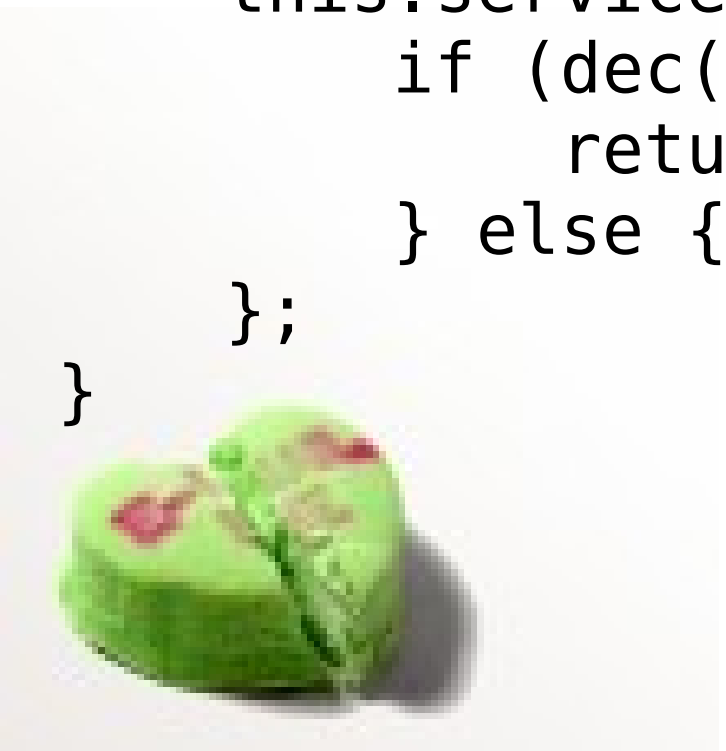
```
function main(link) {
  link.onclick = function(e) {
    var newa = document.createElement("a");
    var tn = document.createTextNode("second");
    newa.appendChild(tn);
    newa.href = "#";
    this.firstChild.nodeValue = "clicked";
    var that = this;
    document.body.appendChild(newa);
    newa.onclick = function(e) {
      that.firstChild.nodeValue = "reset";
      this.parentNode.removeChild(this);
    }
  }
}
```


object oriented


the boss

public
private
privileged

```
function Container(param) {
    function dec() {
        if (secret > 0) {
            secret -= 1;
            return true;
        } else { return false; }
    }
    var secret = 3;
    var that = this;
    this.service = function () {
        if (dec()) {
            return param;
        } else { return null; }
    };
}
```



```
function Container(param) {
    function dec() {
        if (secret > 0) {
            secret -= 1;
            return true;
        } else { return false; }
    }
    var secret = 3;
    var that = this;
    this.service = function () {
        if (dec()) {
            return param;
        } else { return null; }
    };
}
```

private

```
function Container(param) {
    function dec() {
        if (secret > 0) {
            secret -= 1;
            return true;
        } else { return false; }
    }
    var secret = 3;
    var that = this;
    this.service = function () {
        if (dec()) {
            return param;
        } else { return null; }
    };
}
```

private

privileged

```
function Container(param) {
    function dec() {
        if (secret > 0) {
            secret -= 1;
            return true;
        } else { return false; }
    }
    this.member = param;
    var secret = 3;
    var that = this;
    this.service = function () {
        if (dec()) {
            return that.member;
        } else { return null; }
    };
}
```

private

privileged

```
var c = new Container("value");
console.log(c.service());    →
“value”
console.log(c.service());    →
“value”
console.log(c.service());    →
“value”
console.log(c.service());    →  null
```

revealing module pattern

(Christian Heilmann)

```
helpers = function() {
  function reg(c){
    return new RegExp('(\\s|^)'+c+'(\\s|$)');
  };
  function hasClass(el,c){
    return el.className.match(reg(c));};
  function addClass(el,c){
    if (!hasClass(el,c)) el.className += " " + c;
  };
  function removeClass(el,c) {
    if (hasClass(el,c)) {
      el.className=el.className.replace(reg(c),' ');
    }
  };
  return { addClass: addClass,
    removeClass: removeClass, hasClass: hasClass }
}();
```

```
helpers = function() {
  function reg(c){
    return new RegExp('(\\s|^)'+c+'(\\s|$)');
  };
  function hasClass(el,c){
    return el.className.match(reg(c));};
  function addClass(el,c){
    if (!hasClass(el,c)) el.className += " " + c;
  };
  function removeClass(el,c) {
    if (hasClass(el,c)) {
      el.className=el.className.replace(reg(c),' ');
    }
  };
  return { addClass: addClass,
    removeClass: removeClass, hasClass: hasClass }
}();
```

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Don't use closures unless you really need closure semantics.

In most cases, non-nested functions are the right way to go.

Eric Lippert, Microsoft

May not entirely be the truth

```
function AttachEvent(elem) {
  elem.attachEvent("mouseover",
    function() {
      alert(this);
    });
}
AttachEvent(someElement);
```

```
function AttachEvent(elem) {
  elem.attachEvent("mouseover",
    function() {
      alert(this);
    });
}
AttachEvent(som
```

elem has a reference to the handler

```
function AttachEvent(elem) {
  elem.attachEvent("mouseover",
    function() {
      alert(this);
    });
}
AttachEvent(some
```

handler has a reference
to the element
(in the closure)

Beware of accidental closures in IE

loops

```
function main(links) {
  for (var i=0; i<links.length; i++) {
    links[i].onclick = function() {
      alert(i+1);
    }
  }
};

main(document.getElementsByTagName("a"));
```

```
function main(links) {
  for (var i=0; i<links.length; i++) {
    links[i].onclick = function() {
      alert(i+1);
    }
  }
};

main(document.getElementsByTagName("a"));
```

FAIL

alerts 6, 6, 6, 6, 6

```
function main(links) {
  for (var i=0; i<links.length; i++) {
    links[i].onclick =  function( ) {

        alert(i+1);

    }
  }
};

main(document.getElementsByTagName("a"));
```

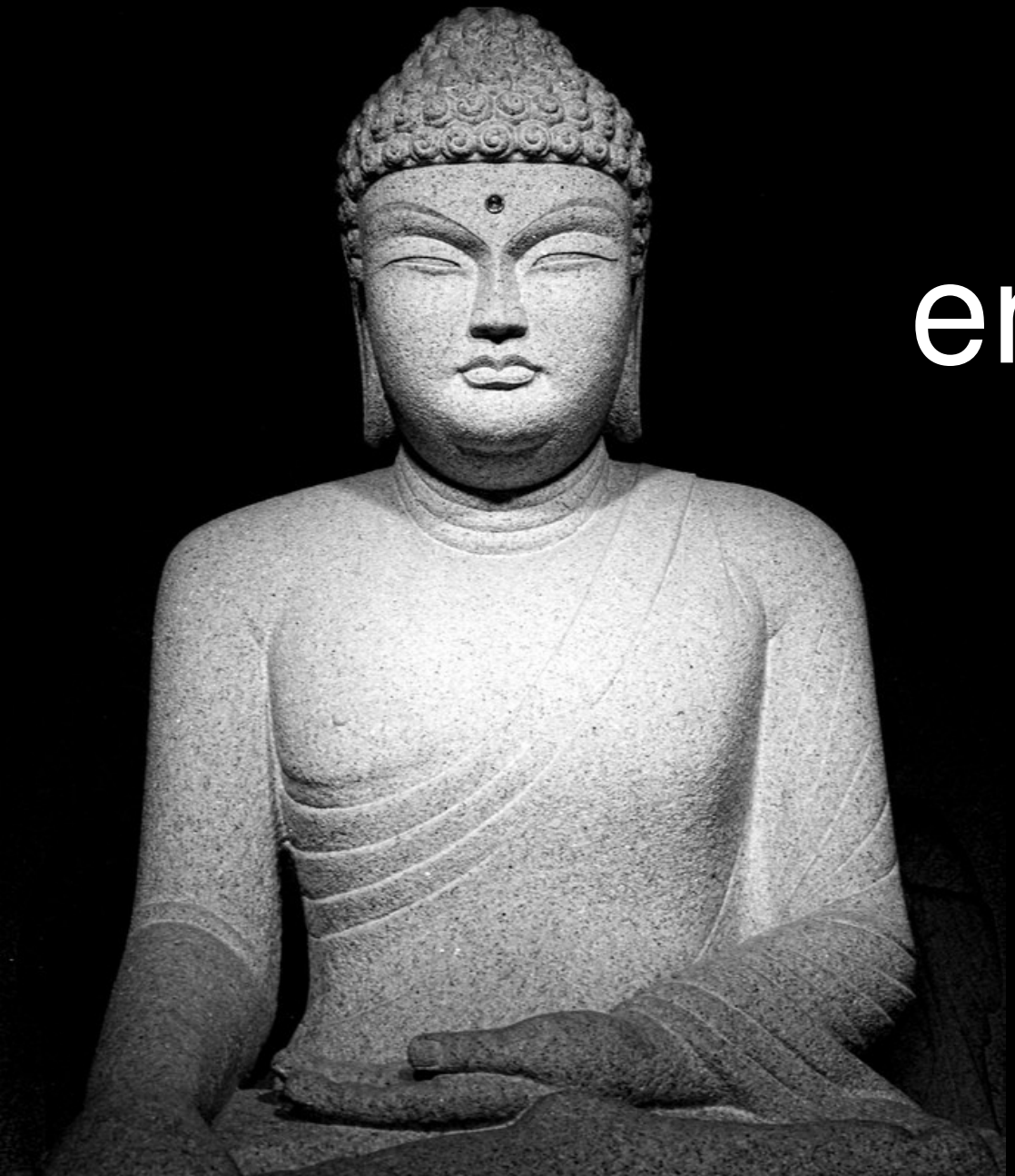
```
function main(links) {
  for (var i=0; i<links.length; i++) {
    links[i].onclick = (function(i) {
      return function() {
        alert(i+1);
      }
    })(i);
  }
};

main(document.getElementsByTagName("a"));
```

```
function main(links) {
  for (var i=0; i<links.length; i++) {
    links[i].onclick = (function(j) {
      return function() {
        alert(j+1);
      }
    })(i);
  }
};

main(document.getElementsByTagName("a"));
```

power



enlightenment

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fin.

http://tinyurl.com/jsclosures

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